OPERATING INSTRUCTIONS

FOR THE

UNIVERTER TYPE 207-E

BOONTON RADIO COMPANY
ROCKAWAY, NEW JERSEY
U. S. A.

MP MASTER
MA24354

5C/12-62/CP

Printed in U.S.A.

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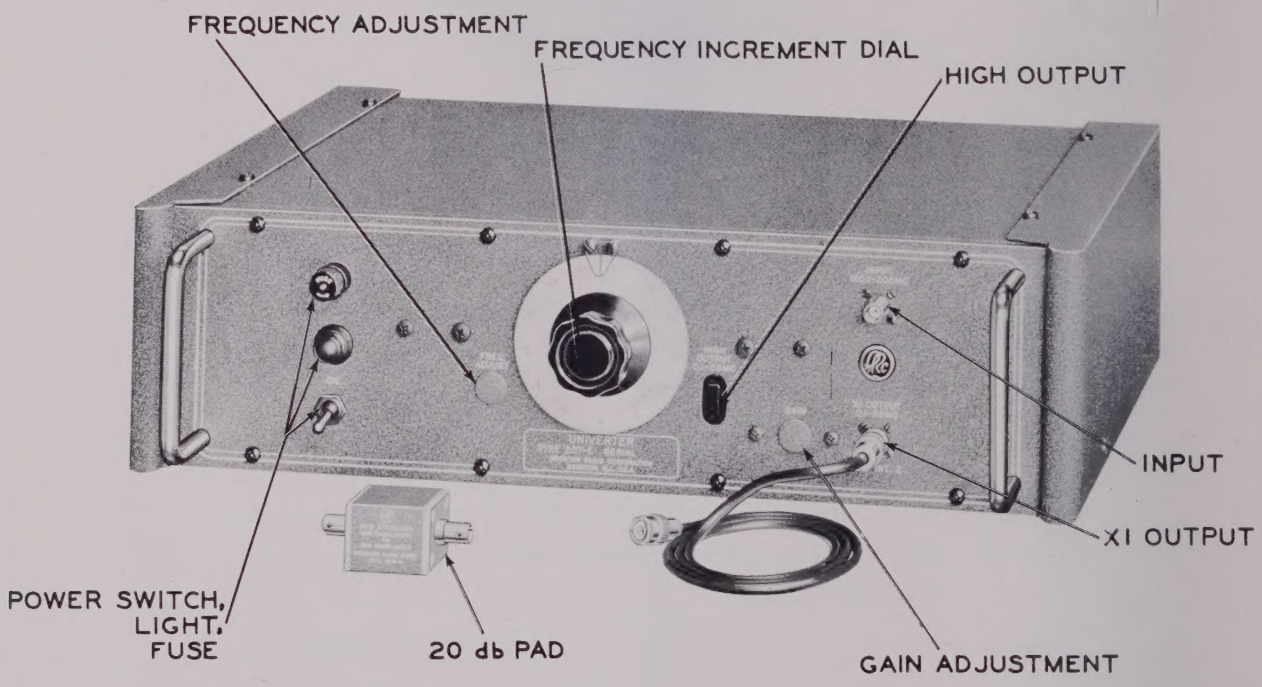


Fig. 1 Front Panel Control and Layout

I. INTRODUCTION

GENERAL

The Type 207-E Univerter, a frequency converting accessory of unity gain, is designed for use with the Type 202-E FM-AM Signal Generator to provide additional frequency coverage of 0.1 mc. to 55 mc. Since the 202-E FM-AM Signal Generator covers a frequency range from 54 to 216 megacycles, the 207-E offers a simple and convenient means whereby the additional coverage of commonly used intermediate and radio frequencies may be obtained. This instrument also makes available at these lower frequencies the frequency and amplitude modulation features and the attenuator calibration of the 202 instrument, without adding any appreciable distortion.

Physically, the Univerter consists of a front panel assembly, RF chassis, and regulated power supply. The power supply chassis is secured to the equipment cabinet, while connections to the RF chassis are made with a cable and plug arrangement from the front panel. The entire assembly is both lightweight and compact, matching the type 202-E FM-AM Signal Generator in proportions and finish.

The cabinet is so designed that the unit may be used as bench type equipment or quickly converted for mounting in a standard 19 inch rack.

All operating controls are located according to function on the front panel.

For convenience in carrying and protection of the front panel controls, two utility handles have been provided on the front panel.

This instrument is supplied complete with tubes, instruction manual, six plugs for the HIGH OUTPUT jack, 20 db T-Pad Type 509-B, and patch cord Type 502-B.

PRELIMINARY INSTRUCTIONS

Set up the 207-E Univerter for use as follows: Connect the 501-B output cable (or suitable cable-adapter combination) to the X1 OUTPUT of the Univerter, connect the 207-E input jack to the 202-E output jack using the Type 502-B patch cord, energize both instruments from any convenient 105-125 volt, 60 cycle power line and allow one hour warm up period before proceeding. (The 207 alone may operate from a 90-130 V, 60 cycle power line.)

To prepare this instrument for rack mounting it is only necessary to, (1) remove the externally available screws securing the two end-bells to the cabinet, (2) remove the end-bells exposing the rack mounting holes in the front panel, and (3) remove the four rubber feet from the bottom of the cabinet.

II. SPECIFICATIONS

RF Range

When used in combination with the 202-E, the RF range is as follows:

Service	*Lower Freq. Limit*	*Upper Freq. Limit*
CW	100 kc	55 mc
AM-Modulation —	100 kc + Modulation Frequency	55 mc
FM-Modulation —	100 kc + Deviation Frequency + Modulation Frequency*	55 mc

**Radio Engineering, F. E. Terman, Third Edition, Page 486.*

Gain

The gain when used in combination with the 202-E, is constant at unity to within ± 1 db.

Frequency Incremental Dial

This dial is calibrated in 5-kc divisions over a range of ±300 kc.

RF Output

1. X1 Output.

The RF output voltage across a 50 ohm load connected to the X1 OUTPUT jack is continuously variable from 0.1 microvolt to 0.1 volt by means of the 202-E FM Signal Generator attenuator. At 0.2 volt input, the output is approximately 0.18 volt.

2. High Output

The RF output voltage at the HIGH OUTPUT jack is uncalibrated but may be controlled from the attenuator of the 202 FM-AM Signal Generator to give a maximum of about 1.5 volts.

Output Impedance

1. 1 Output.

The impedance at the X1 OUTPUT jack, looking into the instrument terminal is approximately 50 ohms.

2. High Output

At this jack the internal impedance is approximately 330 ohms.

Distortion

1. FM. The Univerter introduces no appreciable distortion when a frequency modulated voltage is applied from the 202-E Signal Generator.

2. AM. At carrier levels below 0.05 volts the Univerter adds no distortion to a 50% AM modulated signal. Above this level some rounding of the outward modulation peaks may occur.

Leakage

The RF unit is completely shielded, being enclosed within an aluminum casting having silver plated brass cover plates screwed firmly in place. The oscillator section is well shielded from the remainder of the RF unit by aluminum walls within the main casting. This

use of shielding reduces leakage to a low value. Leakage of the fundamental frequency is a maximum at 55 mc and occurs at the HIGH OUTPUT plug. This leakage is 50 db below the desired signal.

Spurious RF Output

All spurious RF output voltages at input levels of less than 0.05 volts are at least 30 db below the desired signal.

Noise

FM hum modulation is more than 55 db below 10 kc deviation.

Random noise is 4 μv over a 20 kc band width.

Frequency Stability

0.005%/hr. after 1 hour warmup.

Power Supply

The 207-E Univerter is designed for use on 60 cycles, 95-130 volts, with a power consumption of 45 watts. The 207-EP is designed for use on 50~, 95-130V.

Tube Complement

Oscillator - 6C4 (V-105)
Mixer - 6AB4 (V-101)
RF Amplifier - 6AK5 (V-102, V-103)
Output Stage - 6AH6 (V-104)

Dimensions

L — 19¼" W — 5$\frac{5}{16}$" Depth — 10⅞"

Weight 21 lbs.

III. OPERATING CONTROLS

Front Panel ***Fig. 1.***

Power Switch.

This switch applies power to the circuits when in the "ON" position.

Fuse

One fuse in the primary of the voltage stabilizer protects the instrument. This fuse is replaceable from the front panel.

Pilot Lamp

A red lamp, which when lit indicates the circuits are energized. The bulb is replaceable from the front panel.

Freqency Increment Dial

This control, calibrated in 5 kc increments, permits the output frequency to be varied a total of ± 300 kc.

Input Jack

Provides the means of coupling the output of the 202-E Signal Generator to the 207-E Univerter.

X1 Output Jack

Provides the means of obtaining the Calibrated output of the Univerter.

High Output Jack

Provides the means of obtaining the uncalibrated, high-level output of the Univerter.

Frequency Adjust Control

This control is used in the setting of the frequency of the internal oscillator and is accessible by removing the plug button from the Univerter front panel.

Gain Adjustment

This control is used in the setting of the Univerter gain and is accessible by removing the plug button from the front panel.

IV. THEORY OF OPERATION

(See Figs. 2 and 8)

LOCAL OSCILLATOR

A 6C4 triode V105 functions as a modified Colpitts oscillator operating at a frequency of 150 mc. Vernier

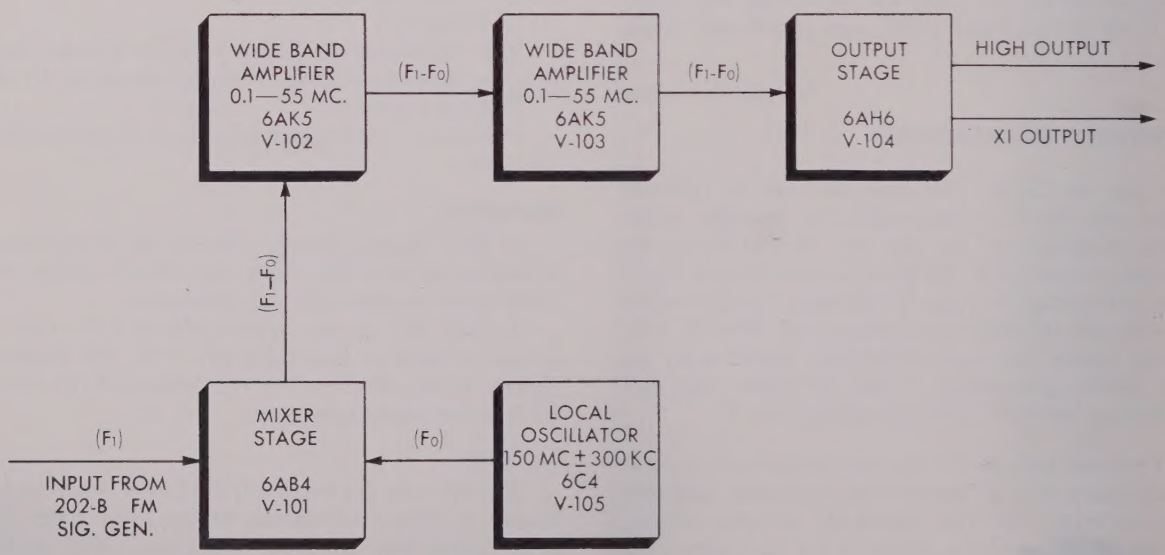


Fig. 2 Basic Elements of 207-E Univerter

capacitor C134 permits the 150 mc center frequency to be shifted up or down the frequency spectrum a maximum of 300 kc. The "Frequency Increment Dial" on the front panel of the instrument controls this vernier capacitor and is calibrated in 5 kc. increments, permitting relatively small changes in output frequency to be made such as are required for receiver selectivity measurements. Variable capacitor C137 available through access hole marked "FREQ", provides a means of zero beating the oscillator with the 150 mc output of the 202 generator with which the 207 is associated. A high degree of oscillator stability is obtained through the use of temperature compensating capacitors.

MIXER

The 6AB4 triode V101 as used is an excellent mixer, because of its very high g_m and because its physical characteristics suit it ideally to high frequency use. The pick up coil L110 introduces the 150 mc local oscillator signal to the grid of the 6AB4 triode V101 while the signal from the associated 202 develops a voltage across the cathode resistor R-101. V-101 mixes the two signals to produce a difference frequency. The 68-ohm cathode resistor shunted by the tube internal impedance of V101 provides the proper 50 ohm termination for the input cable and a 50 ohm termination for the associated 202 generator whose attenuator dial will therefore read directly the voltage applied to the Univerter.

WIDE BAND AMPLIFIER

The two wide-band cascaded amplifier stages V102 and V103 employ four-terminal, low pass, dead-end filter coupling networks, which pass 0.1 to 55 mc. Gain of the instrument is set to unity by means of potentiometers R128 and R117 in the cathode circuits of the 6AK5 tubes V102 and V103 respectively. Cathode degeneration minimizes Miller effect so that the pass band characteristics are independent of gain control settings. The trimmer condensers in the filter networks are used to adjust for a uniform gain over the entire pass-band.

OUTPUT STAGE

The 6AH6 output stage V104 is both cathode and plate loaded. The plate loading has virtually no effect upon the cathode output circuit, indicating that the 6AH6 operates as very nearly a perfect pentode.

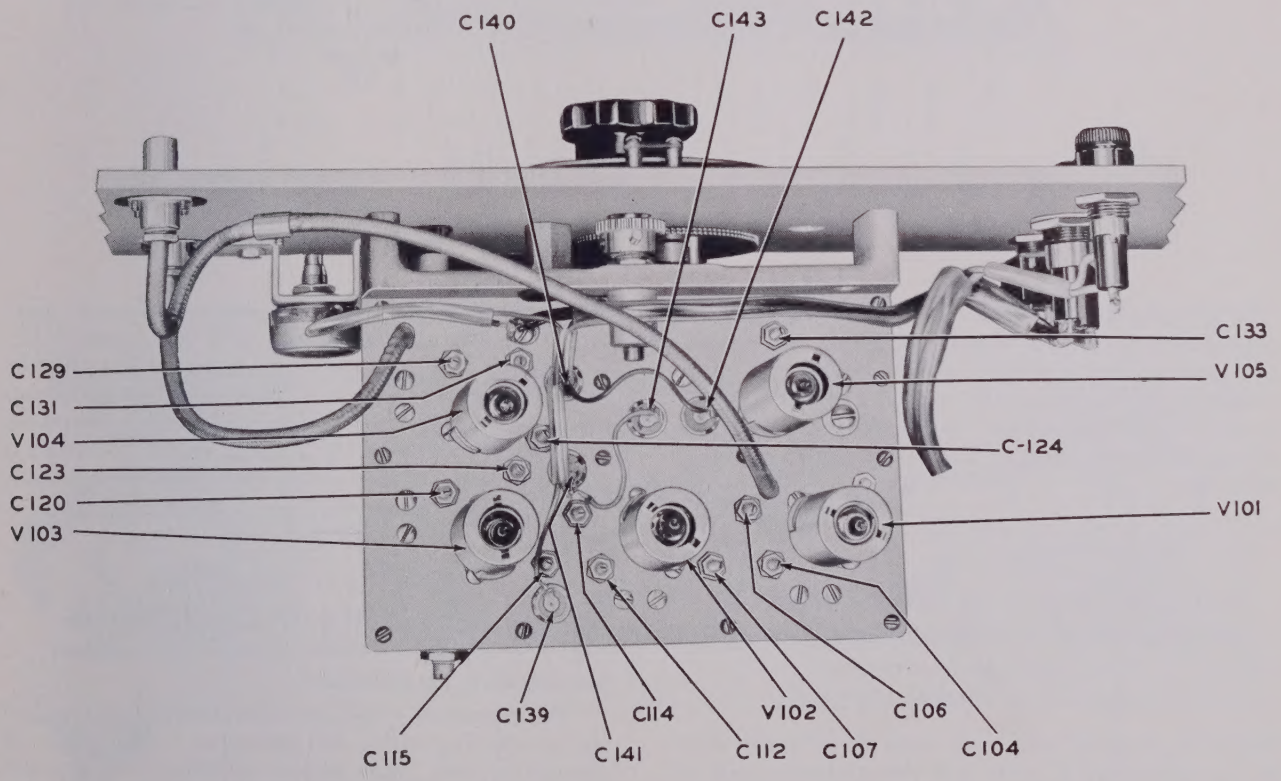


Fig. 3 Top View of Chassis

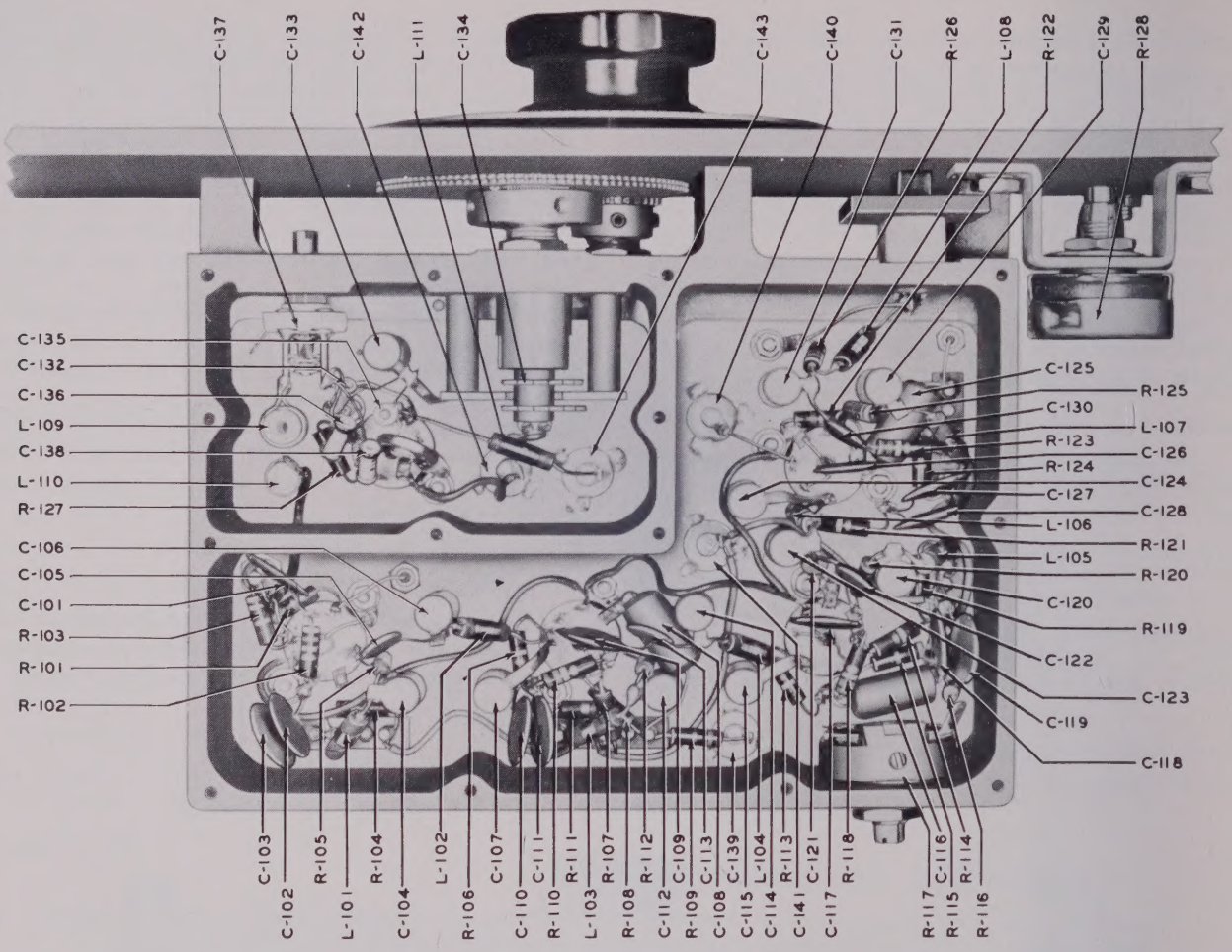


Fig. 4 Bottom View of Chassis

The value of resistance chosen for the cathode resistor is such that the output impedance is 50 ohms. The gain of the Univerter is set so that the open circuit voltage across the 50 ohm internal impedance is twice the input voltage. It follows then that the voltage across an external load is obtained by use of ohms law:

$$1.\ Eo = 2E\ \frac{Z_L}{Z_I + Z_L}$$

Where E_O = 207 output voltage
E = 202 attenuator dial reading
Z_L = load impedance
Z_I = internal impedance

When the external load is 50 ohms the effective gain of the instrument is unity and the attenuator dial of an associated 202 reads the Univerter output directly.

The plate output offers an open circuit gain of 7.5 to 8 times the input voltage at an internal impedance of approximately 330 ohms. This circuit is factory adjusted for maximum pass band flatness with 10 $\mu\mu$f connected externally to simulate an average external load, which is approximately equivalent to a short length of 300 ohm twin lead plus the input capacitance of a vacuum tube. Although the bandpass as viewed across the cathode is independent of plate load the reverse is not true due to changed degeneration resulting from change in cathode load. Therefore a 501-B cable or equivalent 50 ohm termination must be connected as a cathode load if optimum flatness is desired at the high impedance plate output.

V. MAINTENANCE INSTRUCTIONS

FREQUENCY ADJUSTMENT

The frequency of the Univerter oscillator is checked by zero-beating with a 202 generator. This inspection should be made upon receipt of initial delivery and occasionally thereafter. To perform the check connect a null indicator such as a pair of earphones or a sensitive vacuum tube voltmeter to the high output of the Univerter and set the 202 frequency dial to 150 mc. Remove the plug button marked "FREQ" from the 207 front panel, and adjust variable capacitor C137 for

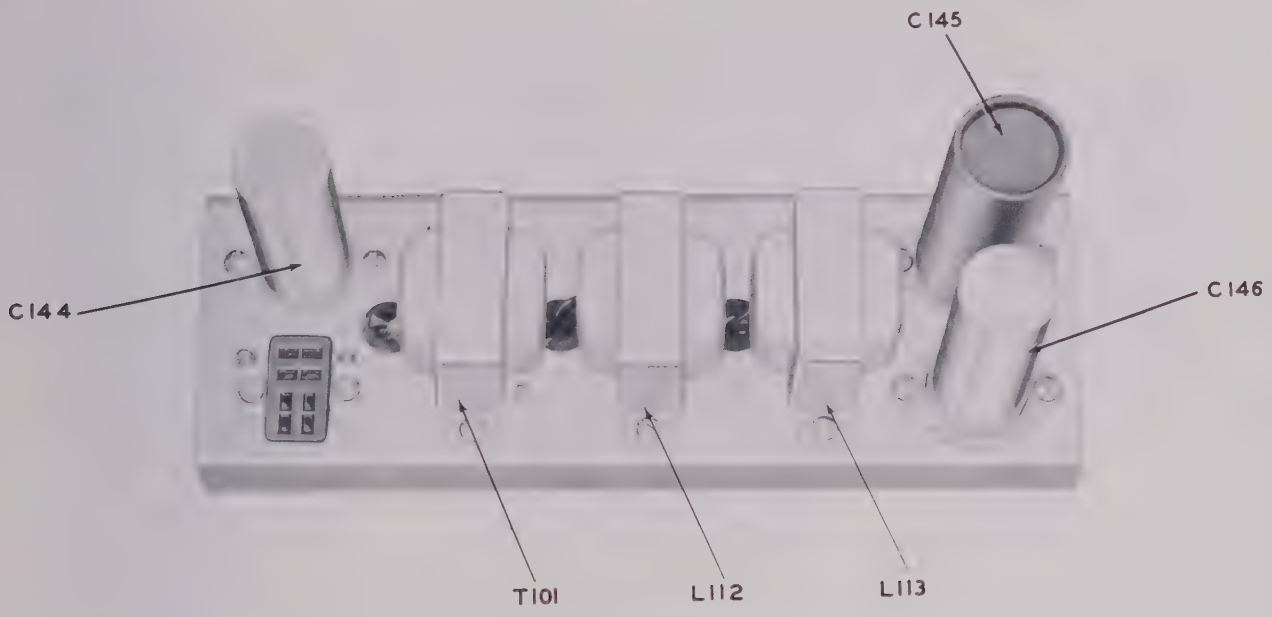


Fig. 5 Power Supply Chassis — Top View

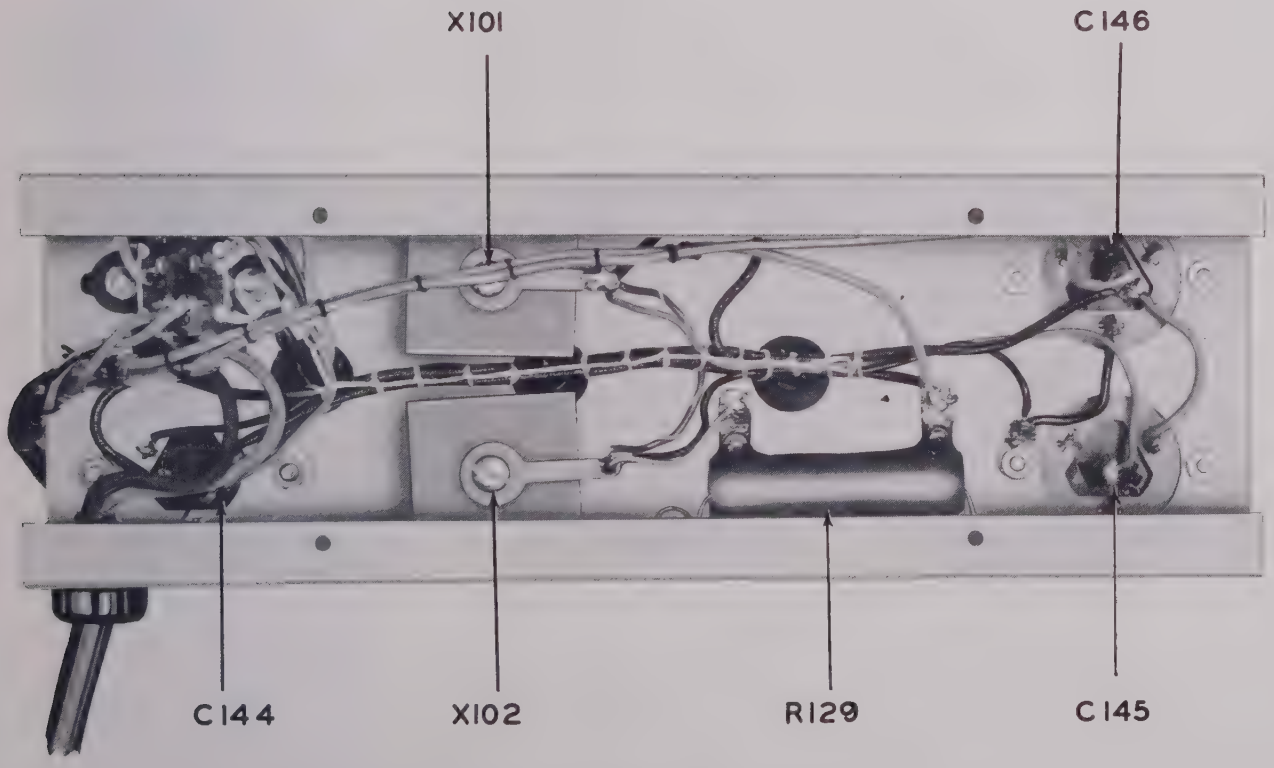


Fig. 6 Power Supply Chassis — Bottom View

zero beat.

GAIN ADJUSTMENT

The gain of the Univerter may be measured by comparing its output voltage as read on a vacuum tube voltmeter with the input voltage from the 202, indicated by the attenuator dial. Connect an accurate vacuum tube voltmeter to the X1 OUTPUT with a 501-B cable and shift the 207 oscillator frequency about 100 KC from zero-beat by means of the "Frequency Increment Dial." The reading of the vacuum tube voltmeter and the attenuator may be made equal (unity gain) by adjusting the first amplifier cathode potentiometer R128 (Fig. 4), accessible by removing the plug button marked "GAIN" from the front panel.

VI. TROUBLE-SHOOTING

Many cases of non-operation or malfunctioning are the result of tube failure. A visual inspection will often show a tube inoperative, and its replacement will restore normal performance.

If all tubes light, but performance is abnormal, the tubes should be checked in a tube tester, and returned, if good, to the sockets from which they were removed.

To facilitate the detection and localization of possible trouble, two charts are presented in the following pages. The first, a "Trouble Chart", lists by symptoms some known trouble conditions and their remedies. The second, a "Socket Voltage Chart", gives average operating potentials under stated conditions.

TROUBLE CHART

Symptom	*Cause*	*Correction*
Univerter inoperative, Pilot light and tubes do not light.	Defective fuse F101.	Replace fuse. If new fuse burns out, check power supply for short circuit.
No output from Univerter.	No voltage from power supply.	Check power supply components and replace any found to be defective.
	Defective tube.	Check tubes in tube tester and replace any found to be defective.
Low output signal at both output jacks.	Defective tube.	Check tubes in tube tester and replace any found to be defective.
	Gain not set to unity.	Adjust gain to unity with R128. If R128 has insufficient control, reset R117 and then readjust R128.
Output frequency incorrect.	FREQ ADJUST capacitor C137 incorrectly set.	Adjust capacitor C137 for correct frequency.
	Defective oscillator tube V105.	Replace oscillator tube and recheck calibration.
	Power supply voltage too low or too high.	Measure power supply filament and DC voltages. Check filter capacitors for leakage and rectifiers for excessive resistance. Test voltage stabilizing transformer T-102 for regulation. Replace defective components.
Excessive lock-in of oscillator and signal generator frequencies.	Defective mixer tube V101 or oscillator tube V105.	Check tubes in tube tester and replace if found to be defective.
Excessive hum on carrier.	Poor filtering of power supply voltage.	Check power supply filter capacitors and replace if found to be defective.
	Bottom plate not firmly secured to Univerter chassis.	Tighten bottom plate holding screws.
	Defective plate or screen bypass capacitor.	Check capacitors and replace any found to be defective.

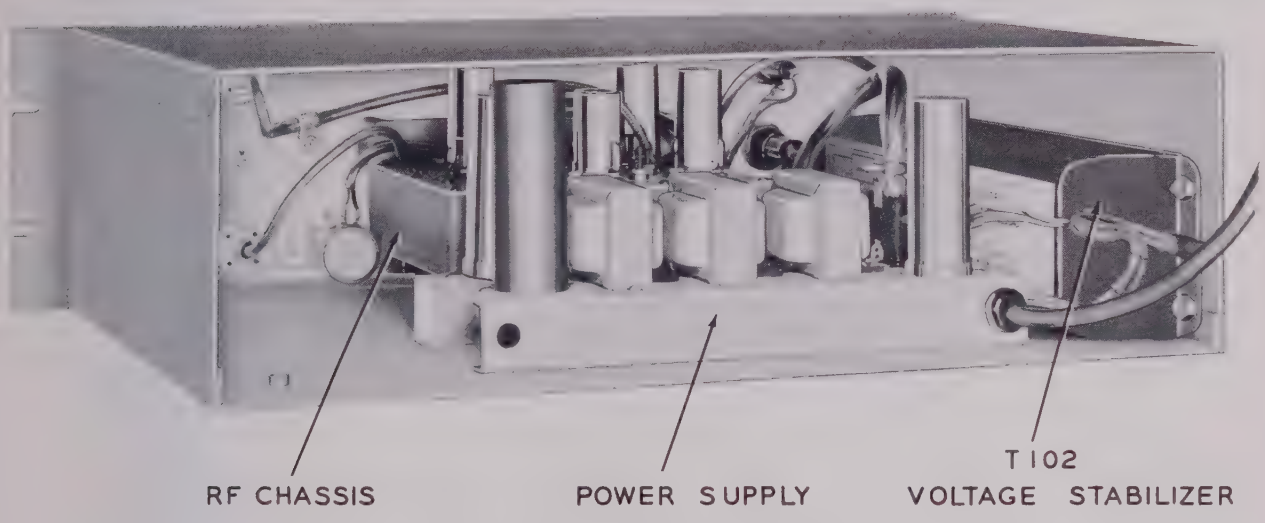


Fig. 7 Rear View of 207-E In Cabinet

SOCKET VOLTAGE CHART

All voltages are dc unless otherwise specified.
All dc measurements are made with 20,000 ohms per volt voltmeter.
All ac measurements are made with 1000 ohms per volt ac voltmeter.
Conditions for measurement:

a. Measurements made with respect to ground.
b. No input signal applied to the Univerter.

Pin No.	1	2	3	4	5	6	7	8
V-101 (6AB4)	170	0	0	5.3	0	1.85	.38	
V-102 (6AK5)	0	2.8	5.18 (ac)	0	167	130	2.8	
V-103 (6AK5)	0	2.5	5.18 (ac)	0	169	115	2.8	
V-104 (6AH6)	—1.13	0	5.25 (ac)	0	170	127	1.25	
V-105 (6C4)	179	0	0	5.3 (ac)	179	9.4	0	

VII. LIST OF REPLACEABLE PARTS

The following parts are replaceable. After replacement it is desirable to make the checks and adjustments described in Section V.

TYPE 207-E UNIVERTER ELECTRICAL COMPONENT PARTS LIST

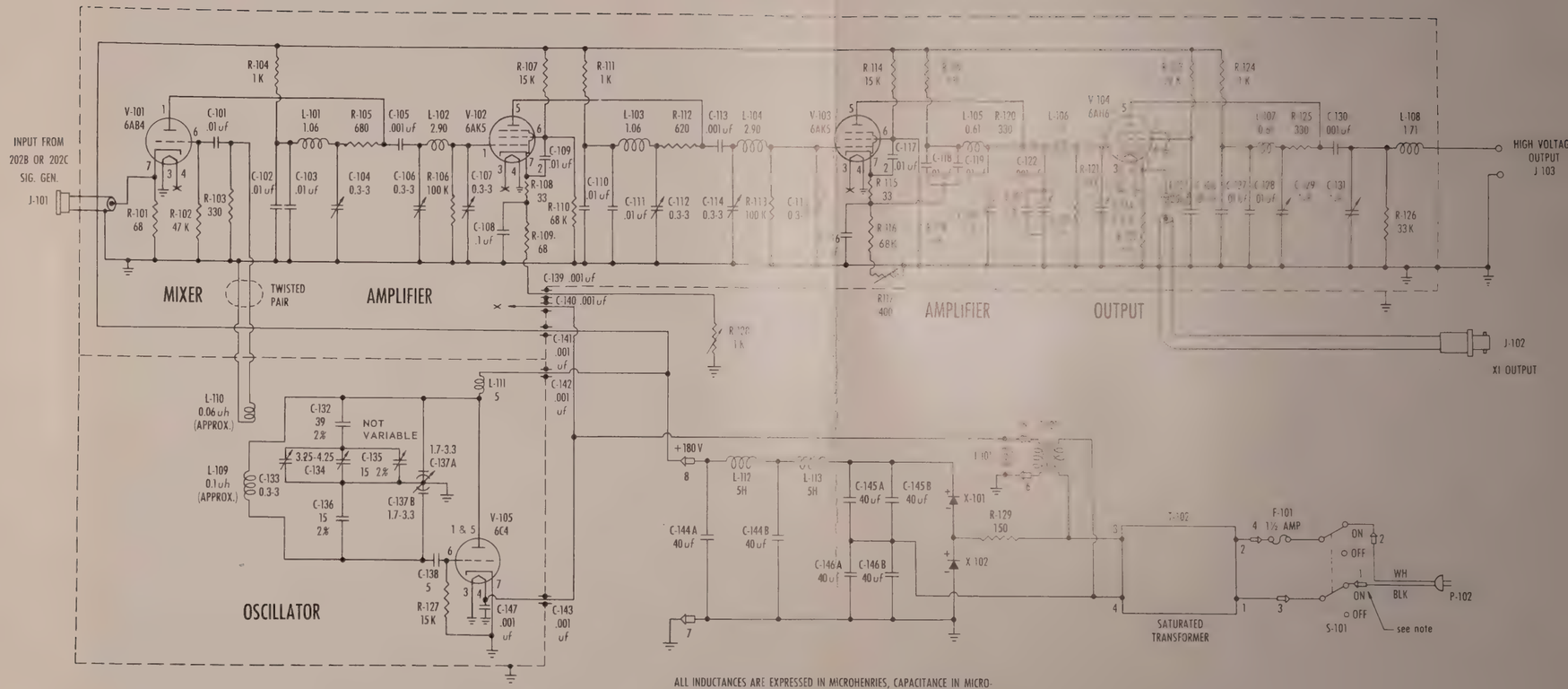
Circuit Symbol	Value	Description	BRC Part No.
R-101	68 Ω	Resistor Fixed, 1/2W ±5%	80057
R-102	47K Ω	Resistor Fixed, 1/2W ±5%	80460
R-103	330 Ω	Resistor Fixed, 1/2W ±5%	80172
R-104	1K Ω	Resistor Fixed, 1/2W ±5%	80148
R-105	680 Ω	Resistor Fixed, 1/2W ±5%	80138
R-106	100K Ω	Resistor Fixed, 1/2W ±5%	80517
R-107	15K Ω	Resistor Fixed, 1/2W ±5%	80336
R-108	33 Ω	Resistor Fixed, 1/2W ±5%	80032
R-109	68 Ω	Resistor Fixed, 1/2W ±5%	80057
R-110	68K Ω	Resistor Fixed, 1/2W ±5%	80549
R-111	1K Ω	Resistor Fixed, 1/2W ±5%	80148
R-112	620 Ω	Resistor Fixed, 1/2W ±5%	80191
R-113	100K Ω	Resistor Fixed, 1/2W ±5%	80517
R-114	15K Ω	Resistor Fixed, 1/2W ±5%	80336
R-115	33 Ω	Resistor Fixed, 1/2W ±5%	80032
R-116	68 Ω	Resistor Fixed, 1/2W ±5%	80057
R-117	400 Ω	Resistor Variable, 2W	81116
R-118	68K Ω	Resistor Fixed, 1/2W ±5%	80549
R-119	1K Ω	Resistor Fixed, 1/2W ±5%	80148
R-120	330 Ω	Resistor Fixed, 1/2W ±5%	80172
R-121	100K Ω	Resistor Fixed, 1/2W ±5%	80517
R-122	68 Ω	Resistor Fixed, 1/2W ±5%	80057
R-123	22K Ω	Resistor Fixed, 1/2W ±5%	80472
R-124	1K Ω	Resistor Fixed, 1/2W ±5%	80148
R-125	330 Ω	Resistor Fixed, 1/2W ±5%	80172
R-126	33K Ω	Resistor Fixed, 1/2W ±5%	80461
R-127	15K Ω	Resistor Fixed, 1/2W ±5%	80336
R-128	1K Ω	Resistor Variable, 2W	81119
R-129	150 Ω	Resistor Fixed, 20W ±5%	80090
C-101	.01 μf	Capacitor, Fixed +80%-20% 600v	82428
C-102	.01 μf	Capacitor, Fixed +80%-20% 600v	82428
C-103	.01 μf	Capacitor, Fixed +80%-20% 600v	82428
C-104	.3-3 μf	Capacitor, Variable pyrex tubular	84088
C-105	1000 μμf	Capacitor, Fixed +80%-20% 600v	82306
C-106	.3-3 μμf	Capacitor, Variable pyrex tubular	84088
C-107	.3-3 μμf	Capacitor, Variable pyrex tubular	84088
C-108	.1 μf	Capacitor, Fixed +30%-20% 200v	83019
C-109	.01 μf	Capacitor, Fixed +80%-20% 600v	82428
C-110	.01μf	Capacitor, Fixed +80%-20% 600v	82428
C-111	.01 μf	Capacitor, Fixed +80%-20% 600v	82428
C-112	.3-3 μμf	Capacitor, Variable pyrex tubular	84088
C-113	1000 μμf	Capacitor, Fixed +80%-20% 600v	82306
C-114	.3-3 μμf	Capacitor, Variable pyrex tubular	84088

TYPE 207-E UNIVERTER ELECTRICAL COMPONENT PARTS LIST - *Continued*

Circuit Symbol	Value	Description	BRC Part No.
C-115	.3-3 μμf	Capacitor, Variable pyrex tubular	84088
C-116	.1 μf	Capacitor, Fixed +30%-20% 200v	83019
C-117	.01 μf	Capacitor, Fixed +80%-20% 600v	82428
C-118	.01 μf	Capacitor, Fixed +80%-20% 600v	82428
C-119	.01 μf	Capacitor, Fixed +80%-20% 600v	82428
C-120	1-8 μμf	Capacitor, Variable pyrex tubular	84089
C-121	5 μμf	Capacitor, Fixed ±5% ceramic	82003
C-122	1000 μμf	Capacitor, Fixed +80%-20% 600v	82306
C-123	1-8 μμf	Capacitor, Variable pyrex tubular	84089
C-124	.3-3 μμf	Capacitor, Variable pyrex tubular	84088
C-125	.25 μf	Capacitor, Fixed +30%-20% 200v	83023
C-126	.01 μf	Capacitor, Fixed +80%-20% 600v	82428
C-127	.01 μf	Capacitor, Fixed +80%-20% 600v	82428
C-128	.01 μf	Capacitor, Fixed +80%-20% 600v	82428
C-129	1-8 μμf	Capacitor, Variable pyrex tubular	84089
C-130	1000 μμf	Capacitor, Fixed +80%-20% 600v	82306
C-131	1-8 μμf	Capacitor, Variable pyrex tubular	84089
C-132	39 μμf	Capacitor, Fixed ±2%	82018
C-133	.3-3 μμf	Capacitor, Variable pyrex tubular	84088
C-134	3.25-4.25 μμf	Capacitor, Variable frequency increment	
C-135	15 μμf	Capacitor, Fixed ±2% N150 500V ceramic	82013
C-137	A1.7-3.3 μμf B1.7-3.3 μμf	Capacitor, Variable (butterfly)	84011
C-138 C-139	5 μμf	Capacitor, Fixed ±5% NPO 500v ceramic	82003
C-139	.001μμf	Capacitor, Fixed Button type ±10%	82307
C-140	.001 μf	Capacitor, Fixed Button type ±10%	82307
C-141	.001 μμf	Capacitor, Fixed Button type ±10%	82307
C-142	.001 μf	Capacitor, Fixed Button type ±10%	82307
C-143	.001 μf	Capacitor, Fixed Button type ±10%	82307
C-144	A 40 μf B 40 μf	Capacitor Fixed electrolytic 200v	83094
C-145	A 40 μf B 40 μf	Capacitor, Fixed electrolytic 200v	83093
C-146	A 40 μf B 40 μf	Capacitor, Fixed electrolytic 200v	83094
C-147	.001 μf	Capacitor, Fixed Button type ±10%	82307
L-101	1.06 μh	Choke, ±3%	300326
L-102	2.90 μh	Choke, ±3%	300325
L-103	.06 μh	Choke, ±3%	300326
L-104	2.90 μh	Choke, ±3%	300325
L-105	0.61 μh	Choke, ±3%	300323
L-106	1.71 μh	Choke, ±3%	300322
L-107	0.61 μh	Choke, ±3%	300323
L-108	1.71 μh	Choke, ±3%	300322
L-109	0.1 μh approx.	Oscillator coil assembly	300328
L-110	0.06 μh approx.	Pick-up coil assembly	300329
L-111	5 μh	Choke, ±5%	300327
L-112	5 h	Choke	85412

TYPE 207-E UNIVERTER ELECTRICAL COMPONENT PARTS LIST - *Continued*

Circuit Symbol	Value	Description	BRC Part No.
L-113	5 h	Choke	85412
T-101		Transformer, filament	85003
T-102		Constant voltage stabilizer	85028
I-101	6.3v, 0.15a	Lamp, incandescent	90904
V-101		6AB4	
V-102		6AK5	
V-103		6AK5	
V-104		6AH6	
V-105		6C4	
X-101	100 ma	Rectifier, selenium	300316
X-102	100 ma	Rectifier, selenium	300316
F-101	1-1/2 amp	Fuse	93250
J-101		JACK, BNC, 1 female contact	89065
J-102		JACK, BNC, 1 female contact	89065
J-103		JACK, Crystal holder type	300286
P-101		PLUG, 8 male contacts	94147
		SOCKET, 8 male contacts	303079
		LIGHT, Indicator, miniature bayonet	303876
		HOLDER, FUSE, extractor post	93677



ALL INDUCTANCES ARE EXPRESSED IN MICROHENRIES, CAPACITANCE IN MICRO-MICROFARADS, AND RESISTANCE IN OHMS UNLESS OTHERWISE SPECIFIED.

"K" = 1,000; "M" = 1,000,000

⇨ POWER SUPPLY CHASSIS PLUG P-101
POINT OF SYMBOL INDICATES DIRECTION OF WIRE
COMING FROM PLUG PRONG INTO CABLE.

Fig. 8 . Schematic Wiring Diagram of 207-E Univerter

APPENDIX

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APPENDIX

OUTPUT CONNECTIONS

A. The method of connecting the load to the 202-E Signal Generator or to the 207-E Univerter must be considered to insure proper interpretation of results, and the following discussion is offered as an aid to the user.

It is convenient to represent a signal source in terms of its open circuit voltage and internal impedance.* Thus a signal source or an antenna can be represented as in Figure 1. For simplicity, only the case where source and load impedance are resistive will be considered.

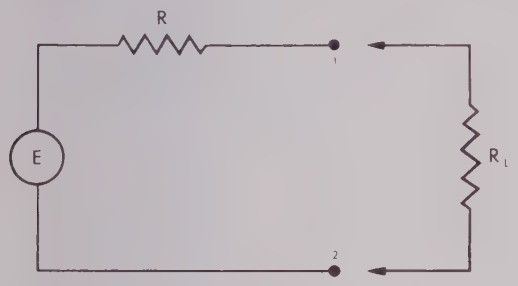

Fig. 1 Signal Source Representation

E — open circuit voltage
R — impedance looking into terminals 1 and 2
R_L — load impedance

For purposes of rating sensitivity, the input to a receiver might have been defined initially either as the open circuit source voltage E or the voltage actually across the receiver's terminals. The Institute of Radio Engineers has established the former method as standard and defined receiver input in terms of the open circuit voltage of the source.**

The impedance of the signal source employed to test receivers should be equal to the impedance of the antenna with which the receiver is designed to operate. Note that in this case the voltage actually across the receiver terminal is $\frac{E}{2}$ (Receiver input impedance equal to source impedance.)

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***The Institute of Radio Engineers, Section 4.01.01, 1947, Standards on Radio Receivers, The Institute of Radio Engineers, Section 4.01.01, 1948, Standards on Television.*

B. *Accessories* for physically connecting the instrument to the load are described in the following:

1. *501-B Output Cable (supplied with 202-E)*

A 501-B Cable attached to the 202 or 207 is illustrated by Figure 2, where R_2 is the 50 ohm termination of the 501-B cable. The equivalent circuit (Figure 3) is readily determined by applying Thevinin's theorem. This arrangement is recommended for general use where it is desirable to connect the 202 or 207 output to an input circuit of relatively higher impedance than 25 ohms. The attenuator of the 202 will read the output directly.

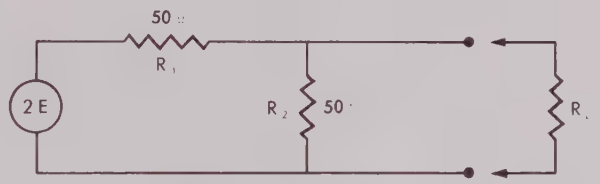

Fig. 2 Output Circuit of 202-E or 207-E with 501-B Output Cable Attached

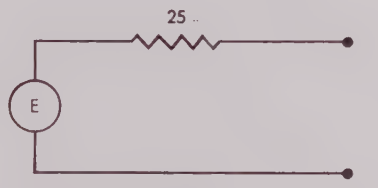

Fig. 3 Equivalent Output Circuit of 202-E or 207-E with 501-B Output Cable Attached

E — 202 attenuator dial reading
R_1 — internal resistance of 202 or 207
R_2 — 501-B cable termination
R_L — load impedance

2. *505-B, 6db Pad*

This pad is used as a dummy antenna in testing unbalanced receivers with a 50-ohm input as shown in Figure 4.

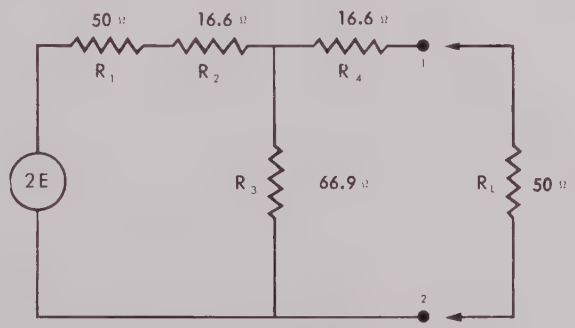

Fig. 4 505-B T-Pad as Dummy Antenna for Receiver

E — 202 attenuator dial reading
R_1 — internal resistance of 202 or 207
R_2 — pad resistance

R_3 — pad resistance
R_4 — pad resistance
R_L — load impedance

The open circuit voltage appearing across terminals 1 and 2 is by Ohms law (equation 1) equal to E, half of the source voltage. Applying Thevinin's theorem

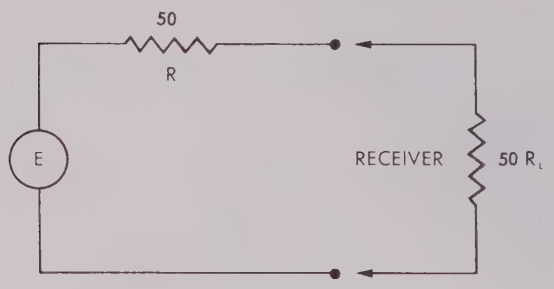

Fig. 5 Equivalent Circuit of a 505-B T-Pad as an Antenna

the equivalent circuit of Figure 5 is obtained, and thus the attenuator dial of the 202 reads receiver sensitivity directly for the assumed standard output.

3. *509-B 20 db T-Pad (Supplied with the 207-E)*

This pad is useful where signal levels are required which are low compared to the constant noise level of the 207. Since the noise level of the 207 is constant, the signal to noise ratio varies directly as the signal level. Therefore, with low output voltage the signal to noise ratio may be improved by increasing the input voltage and attenuating the output. For practical purposes the 20 db pad is useful at output levels below 500 microvolts for the 202-E. The signal applied to a 50-ohm load may be found by dividing the 202 attenuator dial reading by ten.

The 509-B pad, like the 505-B, may be used as a dummy antenna except that the measure of receiver sensitivity (equivalent source voltage) is one-fifth the 202 attenuator dial reading.

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